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1970 ANNUAL REPORT

NEW YORK ZOOLOGICAL SOCIETY



NEW YORK
ZOOLOGICAL
SOCIETY

1970

Seventy-fifth Annual Report

NEW YORK ZOOLOGICAL SOCIETY
The Zoological Park, Bronx, New York 10460

Report of the President

The Lila Acheson Wallace World of Birds

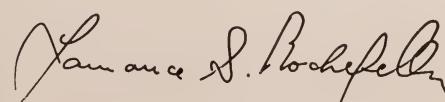


The theme of the year's report to the members is largely one of reflection upon the society's accomplishments of the past three-quarters of a century, and upon the tasks that lie ahead in the next quarter century. In a world where ecology has become a watchword, but remains poorly understood, the mission of the society is now more important than ever. To dwell on the accomplishments of the past would be tempting, but the immediacy of our task allows little time for such luxury. We need instead to view the labor of seventy-five years as an inspiration and guide for the future.

Since there is so little time, we must address ourselves immediately to the problems that beset our world's environment and the creatures it supports. Headlines no longer are guaranteed by prophesying ecological catastrophe — the public has become desensitized to such doom-saying. Therefore, a danger has arisen that ecological problems will be talked to death, while the last rain forest is leveled and the last wild tiger runs out of living space. It now is time for action that will mean more than all of the talk, no matter how well-meaning. Our predecessors in the society concentrated great energy on the plight of the American bison. In the world of the 1970s we must cope with the potential — indeed, the probable — extinction of many more species of larger animals in the wild.

The saving of the bison offers an excellent example of the way in which this society can move to meet the tasks ahead, involving as it did the dedication and energies of the whole membership, the trustees, and the staff. In every way, the society's achievements really are those of its people — the menagerie keeper devoted to his animal charges; the zoologist striving to preserve rare animals in the zoo as well as in the wild; and the member whose support is so very necessary for the success of all these efforts.

An active and strong Board of Trustees is vital for an organization whose endeavors are expanding in scope and increasing in intensity. Our board has those qualities and has been made even more effective by the election of John T. Sargent as one of its members. As I leave the presidency of the society to assume the chairmanship of the Board of Trustees, I am confident that our new president, Robert G. Goelet, has working with him a group of officers which, together with our able staff, will lead the society through these next years that will be so demanding in terms of the problems and opportunities that lie before us. This group, which brings such impressive credentials to its task, includes Howard Phipps, Jr., as Chairman of the Executive Committee; Henry Clay Frick, II, and George F. Baker, Jr., as Vice-Presidents; John Pierrepont as Treasurer; and Augustus G. Paine as Secretary; and William G. Conway as the General Director in charge of the activities of our talented staff.

A handwritten signature in cursive ink, appearing to read "Laurance S. Rockefeller". The signature is fluid and somewhat stylized, with "Laurance" on the top line, "S." in a smaller circle, and "Rockefeller" on the bottom line.

Report of the General Director

Laughing Gull



1970 was the New York Zoological Society's seventy-fifth year. Caught up in the thrust of current problems, the society marked its anniversary only by a twelve minute pause — a retrospective movie at the 75th Annual Meeting.

In twelve minutes, enough can be said about the society to compel respect for its achievements and support for its on-going efforts. The society's history is one of notable events and exceptional people — men like Henry Fairfield Osborn, William T. Hornaday, Charles H. Townsend, Madison Grant, William Beebe, Fairfield Osborn, and others whose names are important in the history of this nation's development of an interest in wildlife and a conscience in conservation. As even a few examples attest, the calendar of the society's accomplishments is replete with events of national and international interest.

1905: Formation of the American Bison Society at the Bronx Zoo.

1907: Bison sent to found the Wichita National Bison Herd.

1922: First duckbilled platypus ever exhibited outside Australia shown at the Bronx Zoo.

1934: William Beebe, with Otis Barton, descended 3,028 feet in the ocean off Bermuda — the deepest man had ever been to that date.

1935: Haitian soledon exhibited at the Bronx Zoo.

1940: Opening of the African Plains at the Bronx Zoo.

1954: Ground breaking for the New York Aquarium.

1965: Cornerstone laying for the Osborn Laboratories of Marine Sciences.

Although the past seventy-five years have resulted in far-flung efforts and innovative programs by the society, this often has not satisfied our goal of improving the fortunes of the wild creatures to which we are devoted. While we have learned more of wildlife and have better interpreted natural history, the areas of wild lands and the populations of wild creatures have declined ever more rapidly and, in some cases, disappeared. It is abundantly clear that only those who work to destroy a natural area or a wild species can ever win a battle in the field of conservation. Those who would protect wild lands and animals, at best, can fight only a holding battle. They can preserve a particular forest or a rare creature only until ignorance or self-interest impels yet another challenge to its existence through further exploitation. Organizations concerned with wildlife are, irrevocably and certainly, losing this unequal struggle in the face of continuing human population increase and technological development — with their consequences in habitat destruction, pollution, and slaughter of wild animals. The educational role of modern urban zoos and aquariums should be seen in this light.

The majority of people in developed nations and the ruling elements in undeveloped nations now live in cities where they will never again see any considerable amount of

wildlife. Nevertheless, the opinions and votes of urban man will determine the future of the efforts to preserve wild animals and in most cases the future of the parks and preserves which are the best hope of wildlife survival. Only in zoos and aquariums, so typical of cities, will most of these people gain other than a vicarious view of wild animals. Already a number of animals, extinct in nature, can be seen only in zoos.

The liveliest of environmental education institutions, the zoo and its collections are dependent intimately upon the changing fortunes of wild creatures. Hence zoo trends are more drastically affected by the events now altering our environment on a world-wide basis than those of other museums. The health of wildlife populations has been likened to that of the traditional miner's canary, a sensitive index to the ability of the environment to support life. With the built-in and ever-changing stimuli of their living collections, zoos and aquariums possess unique qualifications to generate interest in the environment. And they provide man with a respite from much that is bad in the urban habitat, a respite that may be unequalled.

The highlights of the year past are summarized in the reports that follow. It remains to outline some new directions and plans for the immediate future.

New directions

During 1970 the society accelerated its program, first announced in 1961, of revising the collections with a view toward showing fewer species, in order to maintain the kinds exhibited better and more meaningfully and in more suitable spaces. In 1961, the zoo displayed 2,887 animals of 1,107 species; in 1970 it exhibited 3,298 animals of 825 species. We are developing larger groups of certain species which have been chosen for long-term breeding programs. In this way, more curatorial attention may be devoted to species-specific requirements, resulting in a larger gene pool being maintained, and providing better opportunities for mate selection and protecting against a crippling loss. By way of illustration, the deer collection has been reduced from the thirteen species of a few years ago to seven. Where the zebra house once displayed several forms of zebra, none breeding successfully, a sizeable herd of a single species is rapidly filling all available space and providing the visitor with the opportunity to see something of the development and maternal care of zebras.

A generous grant from the New York State Council on the Arts has enabled us to establish a new curatorial training program at the aquarium and the zoo, to expand educational and exhibition programs, and to initiate a wholly new graphics and interpretive program at the aquarium. In addition the aquarium has started a formal education program for the first time.

A land-use plan for the aquarium and a comprehensive development plan for the zoo were completed during the year under contract with the firm of Morris Ketchum, Jr., and Associates. The plans present an essential inventory of background information and future opportunities. In addition, the aquarium concentrated upon the development of a scheme for a 2,000-seat whale and dolphin stadium, and strengthened its experimental training programs with whales and dolphins in the existing polar bay exhibit area. At the same time, zoo staff devoted much effort to the planning of the forthcoming Tropical Asia zoogeographic exhibit complex. Meanwhile, the new bison range and the eagles and vultures aviary were substantially completed, and exhibit preparation in the World of Birds began for an opening in 1972.

Changing directions also are affecting the planning of the society's research pro-

grams. Although the efforts of the Osborn Laboratories of Marine Sciences are continuing largely unchanged, the Institute for Research in Animal Behavior is being re-structured to concentrate upon field and conservation studies and to effect economies. Wild lands in many parts of the world are fast disappearing; the time for field studies is now. Moreover, the status and behavior of many diminishing wild animals remains unknown; already the field portions of the institute's program have proven especially productive. The new direction is aided by the generous support of the Scaife Family Charitable Trust. At the same time, the society's need for a fixed field station such as the William Beebe Tropical Research Station has declined and plans have been made to close the station during 1971.

A new development with hopeful implications for the participation of the society's membership in its educational activities has been the recruitment of a vigorous cadre of volunteers, the outgrowth of the interest of a group of New Yorkers who came to the society for counsel on how to improve the Central Park Menagerie. A guide program is now active in our zoo and at the menagerie, and a new committee of the society has been formed to continue to aid the Central Park Menagerie.

Investigations of potential sites for the society's long-planned wildlife survival center continued during the year, but suitable land has not yet been found. The development of the center is probably the most important of the society's future plans, if we are to meet our obligations toward the increasingly endangered species which we exhibit and study and toward future zoo visitors. It is essential that a center be established with sufficient space and facilities to house a significant program of long-term breeding for a number of the more spectacular wild creatures. The recreational and educational value of such a center would be immense and its potential for self-support is encouraging.

The society is dependent upon city appropriations for the support of such a large portion of its zoo and aquarium operation (at least 43 percent of the total society function carried on at the zoo) that the declining fiscal fortunes of New York City cannot help but affect our future most seriously. City officials have been generally sensitive to the needs of the zoo and the aquarium and generous, within the overall framework of City allotments, but support has not kept pace with rising costs, and the society's deficit has increased despite higher admission fees at the zoo and aquarium. The zoo, in particular, is poorly arranged to become self-supporting — a course some city officials predict will be necessary. The realization of new revenues from zoo and aquarium restaurants and other facilities is a necessity. Unhappily, the decline in appearance and upkeep of the residential areas which border two sides of the zoo, as the south Bronx continues to deteriorate, complicates the zoo's problems.

Dr. James A. Oliver rejoined the society's staff in June to succeed Dr. Ross F. Nigrelli as director of the aquarium. Dr. Nigrelli continues as director of the Osborn Laboratories. Assistant Curator of Mammals and Birds Grace H. Davall retired in October after forty-seven years of devoted service to the society.

An old problem intensified

Personnel

The image shows a handwritten signature in black ink. The signature reads "William A. Conway" and is written in a cursive, flowing script. The signature is centered and appears to be a personal or professional title.

The Society in Perspective

For the three-quarters of a century that the New York Zoological Society has existed, it has remained remarkably true to the purposes toward which its founders dedicated it. When the charter of the New York Zoological Society was adopted in 1895, it described an organization that was superbly suited to meeting the conservation challenges of the day. All over the world, wildlife populations were careening toward extinction. From an original population of 65 million American bison, less than 100 wild animals remained. Fur seal colonies were being slaughtered, and in the southeastern United States herons and egrets were being shot and clubbed by the thousands so that their feathers might adorn ladies' hats. Yet all too many people still looked upon wildlife as a resource that could be exploited endlessly without ill consequence.

At the same time, however, there was a great public interest in wildlife — many regions were still unexplored biologically, and there was always the chance that a trek into a strange wilderness might reveal a species of animal hitherto unknown to science.

A critical need existed not only to preserve wild animals but to learn more about them, and to show them to a public with little chance to see them in their native habitats. In this way, and with the publication of books and articles, public understanding of wildlife, so important to its survival, could be furthered.

The society took major steps toward meeting these needs with the opening of the New York Zoological Park (Bronx Zoo) in 1899 and by taking over operation of the New York Aquarium in 1902. Meanwhile the society and its staff members were hard at work in the effort to stop the heedless slaughter of wildlife in the field. The society pressed for legislation to protect birds of plumage and sought to muster public opinion against those who would exterminate entire species for the sake of fashion. The American Bison Society, which was instrumental in rebuilding substantial American



The old New York Aquarium at the Battery (above) has evolved into a sparkling new institution by the sea in Brooklyn (below). Here the society has been able to combine an ever-improving exhibits program with scientific research into the sea and what its secrets hold for mankind.



bison populations from a few pitiful remnants, was established at the Bronx Zoo in 1905 and was in effect an arm of the zoological society.

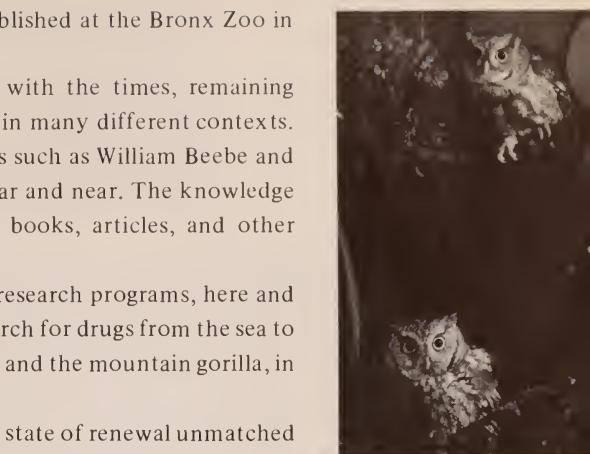
During the years that followed, the society evolved with the times, remaining faithful to its basic purposes but undertaking its mission in many different contexts. Society expeditions, headed by famed scientist-explorers such as William Beebe and Lee S. Crandall, probed the secrets of nature in places far and near. The knowledge gained by society staff members was shared through books, articles, and other publications, scientific and technical.

Today the society supports an even greater variety of research programs, here and around the globe. The society's efforts range from the search for drugs from the sea to studies of rare species, such as the Komodo monitor lizard and the mountain gorilla, in their wilderness homes.

The Bronx Zoo and New York Aquarium today are in a state of renewal unmatched since the beginning of the century and of the society's existence. Our public today is not only interested in wild creatures, but has developed an ecological awareness. The exhibition of wild animals must reach a level that is compatible with this awareness and yet remain a source of recreation as well as education. During the 75 years the society has existed, some species, such as the bison, have been saved from extinction, but many more are threatened. As the society bred bison to restock western ranges in the early part of the century, it today maintains an active breeding program for numerous species of animals extinct, or threatened with extinction, in the wild.

As it begins another quarter-century of existence, the New York Zoological Society still is very much an organization for its times, and today its trifold mission in education, conservation, and research is more vital than ever.

The philosophy of exhibiting wild animals has changed since the old bear dens (at left) were popular in the early years of the century. Today the zoo's bears live in an exhibit that closely duplicates their natural habitat (below). Modern concepts and technology make possible the development of exhibits, as in the World of Darkness (top right), and the Lila Acheson Wallace World of Birds (at right).



The Bronx Zoo long has been a repository for animal's threatened with extinction in the wild. Early in the century, Bronx Zoo bison were shipped west (below) to form the nuclei of herds reintroduced on to their native ranges.



Today the zoo's Pere David deer herd is one of the few herds of these creatures in existence. The Pere David deer (at left) is extinct in the wild in its native China.



Black piranha were bred at the New York Aquarium, possibly for the first time at any public aquarium (at right).



Researchers at the Osborn Laboratories of Marine Sciences (at right) studied a wide spectrum of sea secrets, from the mysterious composition of barnacle cement to new antibiotics from sponges.



Galapagos tortoises were shipped to the Honolulu Zoo (below), which has a fine record for breeding these endangered reptiles.



This little fellow (at left), which hatched at the Bronx Zoo, was the first tufted puffin ever hatched in captivity.



The birth of three Siberian tiger cubs added to the total of these endangered big cats in zoos — and making it more certain than ever that more of these creatures are being kept alive by zoos than survive in the wild.



Department of Mammalogy

The mammal department census shows a decrease in both species and specimens, a reflection of the zoo's intentional reduction in the number of some common species to provide more space for breeding endangered animals and exhibiting animals in natural social groups. As part of this effort, the department is building up its herd of Pere David deer, which have been extinct in the wild in their native China for more than a century. With the acquisition of seven Pere David deer during the year, the Bronx Zoo's herd of 16 animals became the second largest in the world.

The success of the collection of New World bats exhibited in the World of Darkness surpassed all hopes. Great difficulties were expected in maintaining these delicate flying mammals, and the possibility of breeding them seemed remote. However, not only did the bats adjust very well to their exhibits, but they bred actively. On almost any visit zoo-goers can see female bats with young.

The department's other breeding programs resulted in 180 births of 52 species. This figure excludes the new-born bats in the World of Darkness, as there is no way to census the bat breeding colony without disturbing it and risking losses. Notable mammal births during the year included Grevy zebra, wisent, spectacled langur, siamang, suricate, two red brocket deer, and three Siberian tigers.

Mouse lemurs were added to the collection and exhibited at the zoo for the first time since 1913.

Renovation of the Great Apes building and development of the Bison Range moved ahead toward openings in 1971. Basic construction on the Kangaroo House and adjacent areas was completed; the exhibits will be developed during the next year.

Census of Mammals
December 31, 1970

	Orders	Families	Species & Subspecies	Specimens
Marsupialia	Kangaroos, phalangers, opossums, etc.	3	5	14
Insectivora	Moles, shrews, hedgehogs, etc.	2	2	5
Chiroptera	Bats	5	13	146
Primates	Apes, monkeys, lemurs, marmosets, etc.	7	32	118
Edentata	Armadillos, sloths, anteaters	3	5	9
Lagomorpha	Pikas, rabbits, hares	1	1	1
Rodentia	Squirrels, beavers, mice, porcupines, etc.	13	25	102
Carnivora	Bears, raccoons, cats, dogs, otters, etc.	7	47	141
Pinnipedia	Seals, sea lions, walruses	2	2	7
Proboscidea	Elephants	1	2	3
Hyracoidea	Hyrax	1	2	2
Perissodactyla	Horses, tapirs, rhinoceroses	2	4	13
Artiodactyla	Cattle, sheep, antelopes, camels, giraffes, deer, swine, hippopotamuses	7	33	327
	Totals	54	173	888

Summary: orders, 13; families, 54; species and sub-species, 173; specimens, 888.

Opposite: White-Handed Gibbon





Canada Geese

Department of Ornithology

The society's continuing policy of exhibiting larger, more meaningful groups of animals resulted in especially careful selection of new birds during the year. The most significant additions to the collection during 1970 came from two sources: collector Charles Cordier in Cochabamba, Bolivia, and the Edward Marshall Boehm Estate. Charles Cordier sent a variety of hummingbirds, tanagers, cotingas, woodhewers, and tree runners; many of these birds were new to our collection. From the Boehm Estate, we acquired a pair of the rare Palawan peacock pheasants and a group of Ross's touracos. In all, 27 species of birds new to the collection were acquired during the year.

While the 1970 season was not outstanding in the number of species bred or the number of birds reared, it did include significant new accomplishments. The department's "Egg Log" records production of 1,154 eggs, compared to 1,482 eggs in 1969. The greater rhea flock was particularly productive with 123 eggs. Because of limited space, not all of these eggs could be incubated, but 22 greater rhea chicks were reared. Three small flocks of tinamous, each of a different species, accounted for 193 eggs; 38 of these were reared. In all 150 birds of 35 species were reared in 1970. Significant breedings included a puna plover, *Charadrius alticola*, a first captive breeding; two white-quilled black bustards, *Afrotis afra afraoides*, which may be a first captive

breeding for this species and a first breeding for any bustard in the New World; and a tufted puffin, *Lunda cirrhata*, the first recorded captive breeding of any member of the family Alcidae.

A Guilding's amazon parrot, *Amazona guildingi*, was shipped to the Houston Zoo, where there are two others, on a permanent loan basis as part of a cooperative propagation project for this very rare island form.

The Eagles and Vultures Aviary was finally completed in the fall of 1970. Because of the advanced season, little exhibit decoration could be attempted and only one exhibit, for South American condors, was completed by year's end.

The most important physical improvement during 1970 was construction of the World of Birds. By November, the contract was more than 90 percent complete, and advance work on displays was begun by the bird department and the exhibits department, and by Dennis Brown, director of horticulture at the New York Botanical Gardens, who contributed greatly to our plans for planting the new displays. The building is scheduled to open to the public in 1972.

Orders	Families	Species & Subspecies		Census of Birds December 31, 1970
		Subspecies	Specimens	
Sphenisciformes Penguins	1	8	22	
Struthioniformes Ostriches	1	3	4	
Rheiformes Rheas	1	2	11	
Casuariiformes Cassowaries and emus	2	2	9	
Tinamiformes Tinamous	1	4	27	
Podicipediformes Grebes	1	2	3	
Pelecaniformes Pelicans, cormorants, etc.	3	8	25	
Ciconiiformes Herons, ibises, storks, etc.	4	22	107	
Phoenicopteriformes Flamingos	1	6	48	
Anseriformes Swans, ducks, geese and screamers	2	80	469	
Falconiformes Vultures, hawks and eagles	3	15	20	
Galliformes Quail, pheasants, etc.	3	16	85	
Gruiformes Hemipodes, cranes, trumpeters, etc.	7	26	98	
Charadriiformes Plovers, sandpipers, gulls, etc.	9	41	185	
Columbiformes Pigeons, doves and sandgrouse	1	8	18	
Psittaciformes Parrots, etc.	1	16	64	
Cuculiformes Touracos and cuckoos	1	7	22	
Strigiformes Owls	1	15	30	
Caprimulgiformes Frogmouths, nighthawks, etc.	2	2	6	
Apodiformes Hummingbirds	1	6	12	
Coliiformes Colies	1	1	4	
Trogoniformes Trogons, quetzals	1	4	4	
Coraciiformes Kingfishers, hornbills, etc.	6	12	27	
Piciformes Barbets, toucans and woodpeckers	3	7	23	
Passeriformes Perching birds	31	163	594	
Totals		88	476	1,917

Summary: orders, 25; families, 88; species and sub-species, 476; specimens, 1,917.

Department of Herpetology

The department continued to devote its energies toward increasing the breeding potential of the collection by reducing the total number of species and developing larger breeding colonies.

The result of these efforts was an improved breeding record, highlighted by the birth of eight tentacled snakes. Six blue-spiny lizards were born in the desert scene, and once again this year our Asiatic cobra produced viable eggs which yielded 12 hatchlings. The reticulated pythons, corn snakes, and pigmy rattlesnakes also successfully bred in 1970. A number of Haitian giant treefrogs were successfully reared from eggs deposited in the torrent stream exhibit by adults added to the collection during the year.

The 1970 acquisitions included nine Clark's spiny-tailed lizards from Michoacan, Mexico, the first time this species has been in the collection, as well as golden tree snakes, paradise tree snakes, Jameson's mamba, black mamba, Schlegel's vipers, Malayan black cobras, Ceylonese cobras, water dragon, dwarf caiman, Wagler's viper, Jackson's chameleons, Hispaniola long-nosed tree snakes, and Asiatic leaf frogs.

Gifts included an African savannah monitor, a blood python, a Bengal monitor, two emerald tree boas, and a ball python.

Five of our six Galapagos tortoises were sent to the Honolulu Zoo. It is hoped that they will contribute to Honolulu's successful Galapagos tortoise breeding program and to future generations of this species.

Census of Amphibians and Reptiles
December 31, 1970

		<i>Species &</i>	
	<i>Orders</i>	<i>Subspecies</i>	<i>Specimens</i>
Amphibia		19	107
Reptilia		157	386

Summary: orders, 5; families, 37; species and subspecies, 176; specimens, 493.

Children's Zoo

The Children's Zoo celebrated its 30th year; total attendance was 344,022 persons. A number of new exhibits were constructed, including a striking new entrance way, and opportunities for direct animal contact for children were increased. Children can now enter a small corral to pet and to feed lambs and pigmy goats. In another area, known as the Kitchen Counter, wild animals which can be handled, such as ferrets, sparrow hawks, and snakes, are held by attendants for close inspection by the children.

New ways were sought to make a visit to the Children's Zoo educational as well as entertaining. More attention was given to children visiting in groups, and labels for adults, with information to help in answering a child's many questions, were incorporated into many exhibits.





Veterinary Services

With a new veterinarian assuming full-time duties, 1970 was a year to organize and to develop new programs and to plan expansion of veterinary services. Two new laboratories, hematology and histopathology, were added within the existing Animal Hospital building, as the zoo's veterinary facilities continued to expand.

Major programs in nutrition, comparative pathology, and comparative ophthalmology have been initiated with the help of several prominent consultants. Dr. Ben Sheffy of Cornell University is the chief consultant for the nutrition program. Dr. Sheffy and his virology laboratory at Cornell University also will consult on virology during 1971.

The New York Medical School has played an increasingly important role since April 1970, in the development of a comparative pathology program; Dr. Ralph Strebel directs this program. The medical school performed all serology, histopathology, and microbiology in 1970. For the first time in the history of the society, complete histopathology is performed on all dying zoo animals.

Dr. Roy Bellhorn and Dr. Paul Henkind have acquired a grant to study vascular disease and comparative ophthalmology. Our cooperative program involved the study of normal anatomy in the living and necropsied specimens, as well as the examination of pathological specimens.

Dr. Lucy Clausen, a long-time consultant in parasitology and a scientific fellow of the society, has begun extensive classification of parasites within our ruminant herds.

Research by Zoo Staff

The staff of the zoo, in addition to duties in the park, participate in zoological research programs here and around the world. Staffers attended scientific gatherings in their special fields throughout the United States. They also traveled to places such as Komodo Island, Indonesia, and South America.

Dr. F. Wayne King, curator of herpetology, traveled to Indonesia and Malaysia where he helped Dr. Walter Auffenberg, a research associate of the society, in the conclusion of his study on the ecology of the Komodo monitor. In addition, Dr. King made observations on the status of conservation in that area. Members of the herpetology department also met with officials of the United States Bureau of Sports Fisheries and Wildlife and with the Reptile Products Association in an attempt to develop methods of separating the different species of crocodilians on the basis of their belly skins, which are used in the leather trade.

Studies of ratites continued during the year by the department of ornithology, with special emphasis on behavioral and physical development and nutritional requirements. Assistant Curator Donald Bruning studied rheas in the field. His observations were made in Argentina at the height of the greater rhea breeding season. Research also continued on food additives necessary to maintain natural coloration in certain captive birds, and the department continued to aid the Institute for Research in Animal Behavior in the care and maintenance of a variety of avian groups.

The mammal department assisted in a variety of research projects being conducted by several staff members of the Institute for Research in Animal Behavior, as well as working with animal behavior students from Sarah Lawrence College.

Opposite: Pine Barrens Treefrog

The year 1970 was the year of population explosion at the New York Aquarium. It began in June when the black piranhas (*Serrasalmus rhombeus*) began spawning. In October, just a week after we received a New York State permit to exhibit the species, the piranha eggs began hatching and we soon had several hundred young. This was the first spawning of the piranha at the aquarium and possibly the first time this species has spawned in captivity.

At about the same time, a large female giant Pacific octopus (*Octopus dofleini*) laid thousands of eggs. Because she had been isolated from any male for nearly six months, it was thought that the eggs were infertile. However, the eggs began to hatch in October, and for about two weeks, hundreds of babies were added daily to the collection. Unfortunately, virtually nothing is known of the requirements of newly hatched octopodes, and all our efforts to rear them were to no avail.

The hatching of the octopus eggs caused quite a stir in the news, both because of the large numbers of young and the mystery surrounding the fertilization of the eggs. However, the only scientifically viable theory is that the female mated normally in the wild before being collected, and retained the live sperm in a receptacle until the eggs were fertilized. This phenomenon of sperm retention now is known to occur in many lower animals.

During the year a number of noteworthy additions were made to the collections. These included a long-nose hawkfish (*Oxycirrhitus typus*), flame angelfish (*Centropyge flammeus*), great barracuda (*Sphyraena barracuda*), wolf eel (*Anarrhichthys ocellatus*), Atlantic wolf-fish (*Anarhichas minor*), walking catfish (*Clarias batrachus*), small-toothed sawfish (*Pristis pectinata*), Pacific banded sea snakes (*Laticauda colubrina*), and two white-sided dolphins (*Lagenorhynchus obliquidens*). These and many lesser replacement specimens were donated by friends, collected by our staff, purchased, or received in exchanges with other institutions.

Two of our black-footed penguins hatched two chicks, making five young hatched by these two birds in two years.

Among the exchanges were five animals sent to larger institutions because of a lack of suitable facilities to contain them after they rapidly doubled and trebled in size. Two California sea lions were sent to the Pittsburgh Zoo, and a trio of wonderfully playful Steller sea lions outgrew the seal island exhibit and were about to walk over all of Coney Island when they were sent to Sea World in San Diego.

The year was also one of internal moves. When three large sand sharks and two large nurse sharks approached the maximum size, they were moved to a 30,000-gallon outdoor tank of oceanic fishes, which is gradually being converted into a major new exhibit.

The second of the major moves involved Alex, one of the male beluga whales. A rivalry had started between the two males and it became necessary to remove one. It was also hoped that the move would encourage the large male, Blanchon, to mate with the two females. Thus, Alex was put in a specially-devised sling, placed in a truck, and relocated in the polar bay pool with the white-sided dolphins.

With Alex separated from the other whales, it was decided to learn something about the intelligence of belugas by training Alex or, at least, conducting behavioral tests on him in isolation. Happily, the move has turned out well in one respect. Although we



Yellowhead
Jawfish

have seen no evidence of courtship or mating by Blanchon, Alex is becoming a splendid performer in the whale-dolphin training sessions.

Earlier in the year, a training demonstration starring our three white-sided dolphins had been developed. This show was one of the main attractions at the society's annual Garden Party, which was held at the aquarium in May. A lovely spring day drew a large crowd of members. Special tours, talks, and a film of one of the society's collecting trips were added features.

The year 1970 was also one of educational innovations. For the first time, the society applied for and was granted funds from the New York State Council on the Arts. At the aquarium, the funds were used in training programs for curator-interns, to introduce special educational activities for the elementary and secondary schools, and

to develop a graphic arts program to augment and to supplement the educational activities.

In support of our expanding educational programs, District 21 of the New York City Board of Education assigned a full-time liaison teacher to coordinate a structured series of class visits to the aquarium.

Attendance for the twelve months reached a new high for any year since 1957, when the aquarium was opened in Brooklyn — 572,816 persons, an increase of 20.5 percent over 1969.

**Census of
the Aquarium**
December 31, 1970

	<i>Orders</i>	<i>Species & Subspecies</i>	<i>Specimens</i>
PHYLUM: Chordata			
CLASS: Chondrichthyes (Sharks, rays and chimeras)			
<i>Squaliformes</i> Sharks	4	7	
<i>Rajiformes</i> Rays, skates	2	3	
CLASS: Osteichthyes (Bony fishes)			
<i>Dipteriformes</i> Lungfishes	2	2	
<i>Acipenseriformes</i> Sturgeon	1	1	
<i>Lepisosteiformes</i> Gars	3	9	
<i>Clupeiformes</i> Tarpon, bonefish	2	5	
<i>Cypriniformes</i> Catfishes	4	26	
<i>Anguilliformes</i> Eels, morays	4	7	
<i>Gasterosteiformes</i> Sticklebacks, pipe-fishes, sea horses	2	24	
<i>Cyprinodontiformes</i> Killies, cavefishes	2	300	
<i>Beryciformes</i> Squirrelfishes, soldierfish	3	14	
<i>Perciformes</i> Perch-like fishes	47	299	
<i>Tetraodontiformes</i> Trunkfishes, trigger-fish, puffers, cowfish	4	12	
<i>Batrachoidiformes</i> Toadfishes	1	12	
CLASS: Reptilia (Reptiles)			
<i>Testudines</i> Turtles	7	18	
CLASS: Aves (Birds)			
<i>Sphenisciformes</i> Penguins	2	23	
CLASS: Mammalia (Mammals)			
<i>Pinnipedia</i> Seals, sea lions	6	14	
<i>Cetacea</i> Whales, dolphins	2	6	
PHYLUM: Porifera			
CLASS: Demospongiae (Siliceous, horny sponges)	2	30	
PHYLUM: Coelenterata			
CLASS: Anthozoa (Anemones, corals)	9	1,341	
PHYLUM: Annelida			
CLASS: Polychaeta (Marine worms)	2	4	
PHYLUM: Arthropoda			
CLASS: Crustacea (Lobsters, shrimps, crabs)	14	312	
CLASS: Arachnida (Horseshoe crabs)	1	5	
PHYLUM: Mollusca			
CLASS: Gasteropoda (Snails)	2	33	
CLASS: Pelecypoda (Oysters, clams)	2	237	
CLASS: Cephalopoda (Octopus, squid)	1	1	
PHYLUM: Echinodermata			
CLASS: Asteroidea (Starfishes)	9	59	
CLASS: Echinoidea (Sea urchins)	2	90	
CLASS: Holothuroidea (Sea cucumbers)	2	10	
Totals		148	3,052

More than 70 percent ocean, the world we call Earth might better be known as the water planet. Today, there is increasing awareness of the sea and its importance. Words and concepts, such as plankton, food chains, ecosystems, non-biodegradable pollutants, and countless others, are now part of the everyday jargon of the average citizen. This, of course, is as it should be. For without water, under its various guises, all life would cease to exist. Knowledge of things aquatic, quickening to a deepened concern and appreciation of them, is, therefore, of planetary significance.

The Osborn Laboratories of Marine Sciences have been at the forefront of studies dealing with the water environment. Like the staff of Neptune, the laboratories are, in a sense, tridentate: firstly, by actually carrying out meaningful research programs; secondly, by making the work known both through scientific publications and reports and through popular writings and lectures; and thirdly, by encouraging others to become involved in conducting active research-training and educational programs.

Recognized for their work throughout the world, staff members of the laboratories this past year were involved in programs in Russia, Europe, Canada, and the Pacific Islands, as well as numerous cities within the United States. Several of these encounters dealt with problems of global urgency. Dr. Ross F. Nigrelli, director of the laboratories, critically evaluated the potentialities and limitations of marine resources at the International Joint Conference on "Environment and Society in Transition." This week-long conference, sponsored by the American Geographical Society and American Division of the World Academy of Art and Science, was held at the New York Academy of Science and concerned itself with a detailed, concise enunciation of current complex environmental problems and with possible avenues of solution.

The global impact of environmental problems and the urgent need for international cooperation are perhaps more poignantly highlighted in Europe. There the most ambitious efforts of one country can be utterly negated by the lack of effort or indifference of a neighboring country. Dr. Nigrelli and Dr. George D. Ruggieri, S.J., participated in an eight-day symposium on marine biology in Venice, Italy, at which the subsidence of the Venetian landmass held high priority. The merits of a number of suggested methods for controlling water flow formed the basis for lengthy discussions. This problem, though local, will obviously not be resolved without extensive outside assistance.

The use of animals and plants as sources of human medicinals is as ancient as man himself. Researchers at the Osborn Laboratories of Marine Sciences have been the pioneers in studies dealing with marine organisms as possible sources of pharmacologically active substances. Numerous marine animals such as sponges, sea cucumbers, sea worms, etc., are being investigated for antibacterial, anti-viral, and anti-cancerous agents. Dr. Martin Stempien's work on antibiotics from marine sponges has been expanded with the recent acquisition of a grant from the National Oceanographic and Atmospheric Administration (NOAA).

Dr. Myron Jacobs presented some of his findings on the structure of the brains of the whales and dolphins at the IX International Congress of Anatomy held in Leningrad, Russia. Dr. Jacobs' studies are designed to provide factual insights into interpretations of the neural mechanisms underlying the behavior of whales and dolphins. For example, his studies suggest that the highly developed systems of sonic and ultrasonic

communication in these animals is dependent upon the especially enriched innervation of the saclike extensions from the mucous membrane lining of the nasal passages.

The mechanism by which barnacles adhere to surfaces such as ships has been the object of much interest and of detailed studies. The single approach to the problem will, hopefully, answer two quite different questions. Once the chemical constitution of the adhesive material of the barnacle is elucidated, it should be an easy task to employ inhibitors to prevent them from adhering to ships. At the same time it could indicate a very useful cement for such purposes as dental restoratives, bone fractures, etc. Paul Cheung, a Ph.D. graduate-student of Dr. Nigrelli's, has been conducting the studies on the chemistry of the adhesive material in barnacles.

The fish genetics laboratory is unique. It's the only one of its kind and magnitude in the world. The fish *Xiphophorus maculatus*, whose sex determining mechanisms are being studied, is also unique among the vertebrates. It has three sex chromosomes: W, X, and Y. There are three kinds of females: WY, WX, and XX; and two types of males: XY and YY. Dr. Klaus D. Kallman's current research on this species is primarily concerned with the frequency and distribution of the sex chromosomes in natural populations. This information is essential in order to understand how this system has evolved.

Protozoa are indispensable links in the marine food chain, both as consumers of the phytoplankton and also as food for the larger zooplankton. One of the factors that had prevented researchers from evaluating the roles of these one-celled animals in the sea was an inability to grow certain major groups under defined experimental conditions. Dr. Kenneth Gold has been very successful in cultivating three important groups of protozoa: the ciliates known as tintinnids, several non-photosynthetic dinoflagellates, and a group of lorica-building flagellates known as choanoflagellates.

But some protozoans are parasitic and cause deleterious effects on fish. Dr. Nigrelli, with Dr. Jiri Lom of the Institute of Parasitology, Czechoslovakia Academy of Sciences, described a new ciliate which is parasitic to marine fishes. They named the organism *Brooklynella hostilis*, signifying its place of origin and its nasty nature.

Fish have been known to come down with a variety of diseases including viral infections. A number of fish harbor viruses, some of which are lethal. Dr. Jack T. Cecil has been growing cells in culture from a number of marine fishes in order to study the mechanism of viral propagation. In addition to growing cells from various organs of fishes, Dr. Cecil has also established cell lines from a number of organs from marine invertebrates, including the stomach of sea stars and the heart of clams.

Over 50 lectures, seminars, colloquia, etc., were given by members of the laboratories' staff. Several of the staff also participated in two one-half-hour television programs and two radio talk shows. Members of the laboratories were instrumental in helping to set up and in giving a series of lectures to students enrolled in a new program in marine sciences at New York City's John Dewey High School.

The summer research training program offered college students the opportunity of actively participating in on-going research problems. Twenty-one students worked on a wide range of disciplines, including studies on the effects of pollution on various marine animals, the extraction of antibiotics from marine animals, studies on the development of marine invertebrates, and fish diseases. Three of these students were

supported by a special program from Macalester College, ten were supported by the Urban Corps, four were supported by grants of the Osborn Laboratories, and four were volunteers.

Field studies of the ecology and behavior of animals, vertebrate and invertebrate, temperate and tropical, were the focus of research activities of the Institute for Research in Animal Behavior staff in 1970. There was particular concentration on animal societies, how they are organized, and on processes of social communication.

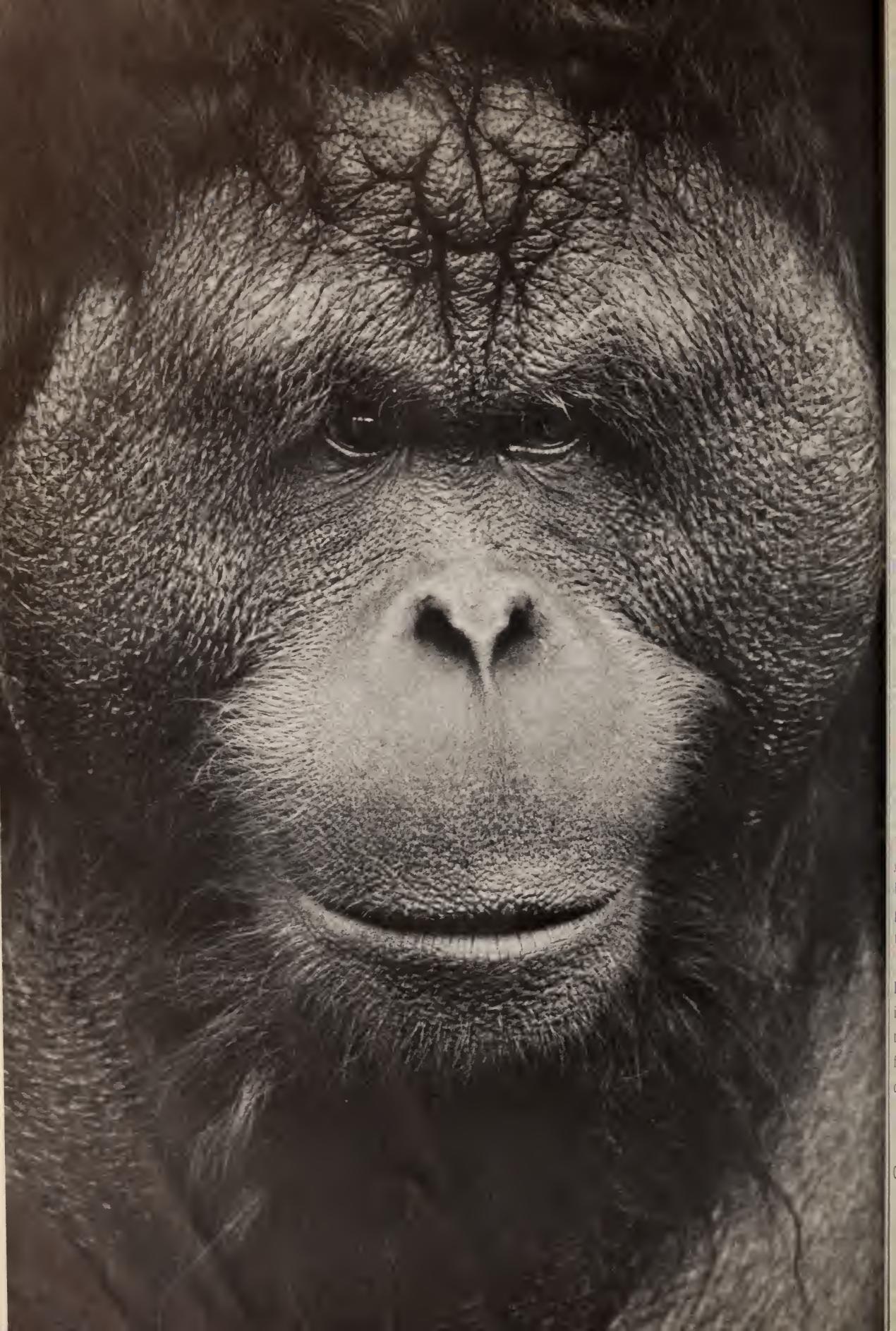
In November the systematic section of the 400,000-word fiddler crab monograph by Jocelyn Crane went to the publisher on schedule. Miss Crane carried out a month-long field trip to Ceylon, which was supported by the National Science Foundation, to continue her study of ritualized aggression in fiddlers. Specifically, she compared behavior of Ceylonese populations with that of members of the same species investigated in New Guinea during 1969.

Dr. Alan Lill continued study of lek phenomena in Trinidad manakins. He made daily observations and measurements at two leks of golden-headed manakins from treetop blinds in the rain forest. His observations substantiated earlier findings that

Axis Deer

Institute for Research in Animal Behavior





large leks attract proportionally more matings than small ones, and suggest that group display is more sexually stimulating to females than solitary display.

In another project Dr. Lill studied song variability in yellow-bellied seed-eaters (*Sporophila nigricollis*) in Tobago. While an individual shows negligible variation in its songs, and the songs of neighboring males are similar, there is marked geographical variation of song type. Localities only three to four miles apart have very different song types.

After a five-month survey of red colobus populations across equatorial Africa, Dr. Thomas Struhsaker settled into the Kibale Forest in western Uganda in April for a year-and-one-half's intensive investigation of the behavior and ecology of red colobus groups there. The varied and relatively undisturbed mature forest types and the abundance and obserability of the canopy-dwelling monkeys makes Kibale an ideal study site.

Habitat destruction in West Africa primarily through human cultivation has been more destructive to red colobus populations than to those of other monkeys. Presently red colobus occur mainly in those few areas which are under protection or have not yet been cultivated. One explanation for the differential effect of human disturbance on red colobus and other monkeys may be the failure of red colobus to respond to each other's "alarm" calls.

Dr. George Schaller spent much of the year writing the scientific report of his three-year lion study in the Serengeti. The completed report has been submitted to the University of Chicago Press and will be published in late 1971 as part of the press' series on wildlife. His investigation focused on predator-relations. Among the interesting results are the finding that the predators, including lions, leopards, cheetahs, and hunting dogs, affect the resident populations of prey species (topi, impala) more than the migratory populations (wildebeest, zebra), which manage to escape much predation because most predators do not migrate. Thus the resident species show noticeable fluctuations in population from year to year, while the numbers of the wildebeest are rapidly increasing.

From October through December, Dr. Schaller journeyed to West Pakistan to survey large mammals, especially some that are threatened with extinction: the salt range urial sheep (*Ovis orientalis punjabiensis*) and two subspecies of markhor goat (*Capra falconeri cashmirensis* and *C. f. chialtanensis*) as the first stage of a long-term study to begin next year. Data on numbers, population dynamics, food habits, and range were gathered in order to assess the present status of these animals. Recommendations for their conservation were submitted to the Pakistani government.

Dr. Roger Payne led an expedition to study the behavior and vocalizations of humpback whales off Bermuda in April and May, and to test new techniques of implanting acoustic tracking devices in whales. The many hours of recordings obtained reveal a consistent "song" pattern similar to that recorded in 1969 but differing from the 1969 pattern in certain details: no whale recognizable from 1969 was definitely identified from the songs heard in 1970.

A preliminary trip to Argentina made by Dr. Payne in the summer resulted in a series

Opposite: Orang-utan

of recordings and photographs of right whales (*Eubalaena glacialis*). The right whales were not apparently making vocalizations in song form, but a series of fascinating and quite varied isolated phonations were recorded. The trip culminated in a search for information on winter sightings of humpback whales in the Antilles (based on interviewing local fishermen on 14 different islands). The results indicate the possibility that there may be two populations of humpback whales in the Caribbean, one semi-resident and the other migratory. Further research on humpback whales and right whales is planned.

Dr. Donald R. Griffin, with the active collaboration of several Rockefeller University graduate students, continued intensive studies of bird navigation by means of a mobile radar. Attention was concentrated on nights with low ceilings and widespread stratus clouds in order to learn more about the flight paths of birds migrating under these conditions. The best data were obtained during the spring at the zoo and near Ellenville, New York, and in the fall at a location near Millbrook, New York.

Many birds were tracked at altitudes that were probably inside the stratus cloud. But available meteorological data are not yet adequate to establish this with certainty. While the lower limits of clouds are observed at all major airports, the tops of cloud layers are not measured extensively or with great accuracy. Thus the evidence is so far only suggestive that birds "fly blind," but the possibility is of sufficient interest to warrant continuing study.

Dr. Peter Marler and Dr. Paul Mundinger reported a successful ten-week summer field project to study the communication systems and reproductive and social behavior of five species of European cardueline finches. They concentrated their attention on one critical species, *Carduelis flavirostris*. Cardueline finches have evolved, radiated, and spread out from the Himalayan region. *C. flavirostris* is of special interest because aside from two isolated populations nesting in Norway and on some of the British isles, it breeds only in the Himalayan mountains and is considered part of the Asian avifauna. This unique distribution pattern suggests that, of the cardueline finches found in Europe, this species' social behavior may more nearly resemble that of the ancestral carduelines than other, more specialized, European species.

Finches collected in Europe were sent to the zoo where they are being studied as part of the finch study program conducted at the Institute for Research in Animal Behavior. During 1970 the program successfully bred five species of cardueline finches including the gray-crowned rosy finch, the first time this species has ever bred at the zoo.

Dr. Fernando Nottebohm conducted laboratory study on the neural control of vocal development in the European chaffinch. This species shows a remarkable asymmetry in the extent to which the right and left hypoglossus nerves control sound production by the syrinx. The left hypoglossus contributes the majority of vocal elements as well as the more complex ones. The right hypoglossus plays a minor role in all vocalizations. The dominant and subordinate roles of these two hypoglossi are reminiscent of the occurrence of a dominant and subordinate hemisphere for speech behavior in humans and, as in humans, these roles are not irreversibly determined at birth.

Dr. Nottebohm is analyzing the vocal behavior of captive hand-reared Amazon parrots brought from Trinidad and housed at the institute. These birds, kept as a group, have formed a very homogeneous vocal dialect which bears little relations to that of their native population. Six months ago, a three-year-old individual from a different group and dialect was introduced into the institute's colony. It has developed a strong "foreign accent." Call dialects in this species may be irreversible by three years of age, though a larger sample is needed before this conclusion is firmly established.



The yearly report for the department of education often reads as a mass of statistics, yet it must not be forgotten that the department deals primarily with children and live animals. The zoo continued to be a popular place for school classes and other organized educational groups to visit during the year. The summer was no exception: during July alone, the total class/group attendance was 46,460, as compared with 37,820 for the previous year.

Fifty-three guided tours were conducted for 1,694 persons; five regular school lectures were given at four institutions for 346 students; 47 lectures were given by department members to audiences totaling 3,451 persons; four television appearances were made with animals; and six summer workshop courses were given for 70 students ranging from the first through the ninth grades.

Throughout the year, 127 natural history programs were given in the auditorium for 6,614 students, from the third grade through high school. These students came from 124 schools and represented 238 classes. Completely new preparatory, lecture, guided tour, and post-visit follow-up materials were written for all the auditorium zoology programs. Other educational literature was also prepared for distribution. Ten different films were shown a total of 43 times to 3,055 persons on Sunday, April 26, during the zoo's Earth Day observances.

The Living Science Program, conducted by the society with Bronx School District

Education

10 under the New York State Urban Education Project, continued during the 1970 spring term as in the past. All of the fifth grade classes (a total of 35 classes and 1,017 students) from certain selected schools in District 10 were involved. Programs consisted of a morning visit by two classes daily to the zoo, with a brief orientation and the showing of a film in the auditorium, followed by a guided tour. In the afternoons, schools were visited by the education department instructors, and students were given lectures and shown animals.

On May 20, the closing day of the District 10 Program, the children of Class 5-1 of P. S. 26X, motivated by our conservation program, presented a play concerning the present state of the environment and pollution, in the department's auditorium. The play was outstanding and was well received by all who saw it. It was written and directed by Howard Safier, the class teacher.

In the fall, the project was handled differently. Programs, though basically similar, were conducted exclusively by a Board of Education science coordinator and a board teacher assigned to the zoo, with assistance from the society in the way of space, teaching materials, guidance information, and films.

A similar program was conducted for classes from School District 8, also under the direction of a specially assigned teacher.

Exhibition and Graphic Arts

The exhibition section of the department was involved in several interesting projects, but probably the most difficult was the renovation of the Great Apes building. The experimental exhibition work was limited to the two new enclosures due to the lack of shifting facilities. The larger of the two exhibit areas will house our group of five young lowland gorillas. Numerous opportunities for exploring and playing have been built into the exhibit, including a waterfall, vines, trees, and concealed "drums." The display was built of gunite and fiber glass, and it is the first of its kind developed for gorillas.

The smaller enclosure was developed as an experimental treetops habitat for a pair of orang-utans. A building devoted to orangs is planned for the Tropical Asia complex and, hopefully, this display will serve as a prototype for future construction. The exhibit is a mass of fiber glass vines, limbs, and tree boles.

Exhibit preparation in the World of Birds building was started during the year. Even before the department entered the building, much preparatory work had been completed, including the casting of a huge section of cliff molded from the Palisades State Park in New Jersey. The "cliff" will be erected in the large walk-through rain forest exhibit.

Any list of projects by the graphics department usually starts with the society's annual meeting, and 1970 was no exception. Other important projects completed during the year include a new entrance way to the Children's Zoo, new directional signs for the zoo, and design of a new library facility in the Administration Building. Educational graphics were developed for the Great Apes building and preliminary design work was initiated on the graphics for the World of Birds.

Opposite: American Bittern



Jerboa



Construction and Maintenance

Construction activity in the zoo for 1970 can be summed up literally in one word – progress. The World of Birds, the Bison Range, and renovation of the Great Apes building were all substantially complete at year's end. Contractual work at the Eagles and Vultures Aviary was completed and the exhibit areas were landscaped.

Other major projects included the erection of a storage building for the facilities department, renovation of the offices for the construction and exhibition departments, alterations in the Administration Building for the establishment of a library, and extensive repair work in the Cafeteria and the Safari Shop. In addition, the department paved over 2,600 square yards of park paths and 4,600 square yards of additional parking area.

The maintenance department planted 2,624 deciduous and evergreen trees and shrubs, 50 bamboo clumps, and approximately 2,000 annuals.

Publications and Public Relations

There are more than 6,000 animals in the collections of the New York Zoological Society, and each one has a message for mankind. Bringing that message to the attention of the public, by means of the printed word and the visual image, is the task of the department of publications and public relations.

The publication of *Animal Kingdom*, the society's bi-monthly popular magazine, and *Zoologica*, its scientific journal, is a key part of the society's effort to impart information on wild animals and the environment on which they depend.

Several *Animal Kingdom* articles drew particular attention during 1970. These included "What's 'Endangered'?", a discussion by William G. Conway of the ramifications of legislation dealing with threatened species, and "Sponges" by Dr. Martin F. Stempien, Jr.

Important to any scientific organization is a research library. Progress was made on establishing the society's library, which is scheduled to go into operation in late spring of 1971.

Jackson Hole Biological Research Station

The zoological society continued its support of the Jackson Hole Biological Research Station in collaboration with the University of Wyoming. Studies at the station during 1970 included:

Margaret Altmann

A comparative study of interspecies communications.

Robert C. Bergstrom

Parasites of ungulates in the Jackson Hole area.

William A. Calder

Respiratory aspects of vocalization.

Thermal aspects of nesting of the calliope humming bird.

Franz J. Camenzind

Ecology and behavior of the coyotes in Jackson Hole.*

Brenton Costain

Ecology of the Uinta ground squirrel in Jackson Hole.*

Jane Logan Dorn

Raven distribution, population dynamics, and ecology in Grand Teton National Park.*

Robert D. Dorn

Life habits, population dynamics, and ecology of mule deer in Grand Teton National Park.*

James E. Guest

Carrying capacity of summer elk range.

Neal Hilstion and Alan A. Beetle

The variation in and ecology of aspen in Wyoming.

John W. Huckabee

Trace elements in small mammal hair.

Newton Kingston

Parasite studies.

Robert W. Lichtwardt and Marvin C. Williams

Studies on Trichomycetes inhabiting the guts of Diptera larvae.

Ellis G. MacLeod

Chromosome cytology, reproductive behavior, and ecology of the insect order Neuroptera.

Norman C. Negus

Population dynamics of microtine rodents.

Glenn A. Noble

Natural stresses and parasitism.*

Michael Parker and Ruth A. Pontius

Studies on the kinetics of uptake of nitrate

Aelita J. Pinter

Effects of environmental variables on some physiological responses of *Microtus montanus* under natural conditions.*

*Received grant from New York Zoological Society.



Richard W. Pontius

Food habits of the Rocky Mountain whitefish.*

Darold Sabinske

The ecology of sagebrush on the glacial outwash plains in Grand Teton National Park.

Jack S. States

Mycological investigations in Grand Teton National Park.

Student Conservation Program Projects:

Marion Klaus

A survey of the distribution and activity of *Drosophila*.

Janice Speas

General observations on coyote behavior.

*Received grant from New York Zoological Society.

As of December 1970, membership in the New York Zoological Society numbered 5,855 persons. The membership dues structure was changed to add more classes of membership and permit a greater range of annual dues giving for members. For only the second time in our history, minimum dues were raised, this time from \$15 to \$25.

Membership

During the year, selected conservation programs were carried on under the society's banner, continuing a tradition of concern for preservation of wildlife that began 75 years ago. Programs for which either complete or partial support was provided in 1970 included:

Conservation Committee

70-001 – Attendance by Park Warden Daniel M. Sindiyo of Amboseli Game Reserve, Kenya, at the International Short Course in National Park Management of the Department of the Interior.

70-002 – Marine park survey in Ethiopia by Dr. Carleton Ray.**

70-003 – Waterfowl conservation work of the Delta Advisory Committee of the North American Wildlife Foundation.

70-004 – Ecological-behavioral study of animals in the Serengeti National Park, Tanzania, using radio-tracking methods.

70-005 – Pesticide study program in the Lake Naivasha eco-system in Kenya by Dr. Leslie Brown and Dr. Tom J. Cade.

70-006 – Summer research projects at the Jackson Hole Biological Research Station (see under Jackson Hole).

70-007 – Study of the effect of pesticides on ospreys by Dr. James R. Koplin.**

**The Charlotte Ordway Wildlife Protection Fund.

70-008 – Ecological study of the pigeon hawk by Dr. Tom J. Cade.**
 70-009 – Ecological study of the timber wolf by Dr. L. D. Mech.
 70-010 – Hornaday Award Conservation Program of the Boy Scouts of America.
 70-011 – Preliminary survey in Pakistan for preparation of long-term ecological study of the Himalayan ungulates by Dr. George B. Schaller.
 70-012 – Expenses for the attendance of Antonio Torrejon, director of tourism and wildlife for Chubut, Argentina, and Gontrau de la Fuenta, of the Argentine department of wildlife conservation, at the International Short Course on National Park Management of the Department of the Interior.
 70-013 – Further study of the Bermuda cahow and its endangerment by pesticides by David B. Wingate.
 70-014 – Study of the systematics and ecology of the lemur in Madagascar by the Office of Scientific and Technological Research Overseas.
 70-015 – Behavioral study of cranes by George Archbold of the Laboratory of Ornithology at Cornell University.
 70-016 – Whale conservation trip to Japan by Dr. Scott McVay.
 70-017 – Right whale research expedition to Argentina by Dr. Roger Payne.
 70-018 – Ecological and behavioral study of the Brazza's monkey in Kenya by Dr. Katherine Simpson.
 70-019 – Ecological study of the greater rhea in Argentina by Donald F. Bruning.

**The Charlotte Ordway Wildlife Protection Fund.

Attendance 1970

New York Zoological Park	2,776,753
New York Aquarium	572,816

Combined Census

	<i>Species & Subspecies</i>	<i>Specimens</i>
Zoo	825	3,298
Aquarium	148	3,052
<i>Total</i>	<hr/> 973	<hr/> 6,350

Opposite: Sea Anemone



Financial Statements

BALANCE SHEET

December 31, 1970

Exhibit A

	Land, buildings, animals and equipment funds				Endowment funds and funds functioning as endowment	
	Current funds		Unexpended	Equity in land, buildings, animals and equipment		
	General	Restricted				
Assets:						
Cash	\$ 1,454,217	25,050	-	-	6,914	
Accounts receivable	756,740	-	-	-	-	
Grants receivable (note 1)	-	656,064	4,925,000	-	-	
Note receivable	-	-	-	-	42,048	
Pledges receivable	147,306	-	538,451	-	-	
Inventories, at lower of cost or market	53,290	134,060	-	-	-	
Prepaid expenses and deferred charges	24,480	-	-	-	-	
Investments (quoted market, \$11,475,175) - (note 2)					11,346,394	
Other	-	27,196	-	-	-	
Due from other funds	-	523,084	801,968	-	1,009,151	
Equipment - visitor facilities, at cost (net of accumulated depreciation of \$446,814) - (note 3)	-	-	-	355,660	-	
Other land, buildings, animals and equipment (note 4)	-	-	-	5	-	
Total assets	\$ 2,436,033	1,365,454	6,265,419	355,665	12,404,507	
 Liabilities and fund balances:						
Accounts payable and accrued expenses	538,613	18,682	33,157	-	-	
Deferred revenue - contributions pledged for future years' operations	147,306	-	-	-	-	
Due to other funds	2,334,203	-	-	-	-	
Fund balances (deficit) - (Exhibit C):						
Unappropriated general fund	(584,089)	-	-	-	-	
Restricted	-	1,346,772	-	-	-	
Unexpended land, buildings, animals and equipment	-	-	6,232,262	-	-	
Investment in land, buildings, animals and equipment	-	-	-	355,665	-	
Endowment	-	-	-	-	2,485,693	
Funds functioning as endowment	-	-	-	-	9,918,814	
Total liabilities and fund balances	\$ 2,436,033	1,365,454	6,265,419	355,665	12,404,507	

See accompanying notes to financial statements.

SUMMARY OF FINANCIAL ACTIVITIES

Year ended December 31, 1970

Revenue:	
Fees and grants from governmental units	\$ 2,836,706
Program service fees and grants	1,245,657
Income from visitor facilities (after deducting	
\$1,489,390 of directly related costs and	
expenses)	652,370
Investment income, gains or losses	582,379
Miscellaneous (including membership dues of	
\$154,189)	178,915
Total revenue	\$ 5,496,027
Support from the public - contributions and grants	<u>7,142,784</u>
Total revenue and support	\$12,638,811
Deduct revenue and support limited by donors (Exhibit C):	
Currently expendable, but only as specified by agreement	\$4,376,083
Construction and acquisition of land, buildings, animals and equipment	<u>6,755,931</u>
Total limited revenue and support	<u>11,132,014</u>
Amount available to finance current general expenditures	\$ 1,506,797
Expenditures:	
Program services	\$ 4,209,710
Support services	434,327
Major acquisitions of land, buildings, animals and equipment	<u>2,555,052</u>
Total expenditures	\$ 7,199,089
Deduct expenditures financed by special funds (Exhibit C):	
Current restricted funds	\$ 2,901,446
Unexpended land, buildings, animals and equipment funds	<u>2,555,052</u>
Expenditures financed by current general revenue and support	<u>5,456,498</u>
Excess of current general expenditures over related revenue and support	<u>1,742,591</u>
	\$ 235,794
Deduct transfers:	
To unexpended land, buildings, animals and equipment funds - net income from aquarium's visitor facilities	\$ 139,653
To funds functioning as endowment - contributions designated by Trustees for general development	<u>208,642</u>
	<u>348,295</u>
Decrease in unappropriated current general fund (Exhibit C)	<u>\$ 584,089</u>

See accompanying notes to financial statements.

STATEMENT OF CHANGES IN FUND BALANCES

Year ended December 31, 1970

Exhibit C

	Land, buildings, animals and equipment funds			Endowment funds and funds functioning as endowment	
	Current funds			Equity in land, buildings, animals and equipment	
	General	Restricted	Unexpended	Endowment	Funds functioning as endowment
Balance (deficit) at beginning of year	\$ (269,723)	687,195	1,178,191	312,191	2,422,101
Additions:					
Current revenue, expendable only as specified by agreement	-	4,376,083	-	-	-
Contributions, grants and appropri- ations for unexpended land, buildings, animals and equipment fund	-	-	6,640,400	-	-
Investment income, gains or losses	-	-	111,006	-	63,592
Equipment acquisitions	-	-	-	74,805	248,580
Other	-	-	4,525	-	-
Total additions	-	4,376,083	6,755,931	74,805	63,592
Deductions:					
Decrease in unappropriated current general fund	584,089	-	-	-	-
To finance expenditures of current funds	-	2,901,446	-	-	-
Indirect costs recovered on research grants	-	93,491	-	-	-
Amounts expended for land, buildings, animals and equipment	-	-	2,555,052	-	-
Provision for depreciation	-	-	-	31,331	-
Other	-	19,735	-	-	-
Total deductions	584,089	3,014,672	2,555,052	31,331	-
Transfers between funds	269,723*	(701,834)	852,755	-	(72,349)
Balance (deficit) at end of year	\$ (584,089)	1,346,772	6,232,262	355,665	2,485,693
					9,918,811

*Transfers from current general fund are reported on Exhibit B, except for this sum representing the deficit at the beginning of the year appropriated from funds functioning as endowment.

See accompanying notes to financial statements.

NOTES TO FINANCIAL STATEMENTS

December 31,
1970

- (1) Grants receivable of the current restricted and unexpended land, buildings, animals and equipment funds represent amounts pledged to the Society for certain operations and for the completion of designated projects in future years. The grants will be collected as expenditures for the designated projects are made by the Society.
- (2) Investments are stated at cost or, if acquired by gift, at fair market value at dates of acquisition.
- (3) Equipment of the visitor facilities in use at December 31, 1970 is being written off over its estimated useful life on a straight-line basis.
- (4) Expenditures for land, buildings, animals and equipment have been charged to operations and to unexpended land, buildings, animals and equipment funds. However, only the cost of equipment of the visitor facilities has been capitalized in the land, buildings

animals and equipment fund. Other such assets including, but not limited to, the following are recorded in this fund at the nominal value of \$5.

National collection of heads and horns,
art gallery, library and sundry items
Collection of living animals
Coney Island real estate
Land and buildings made available by the
City of New York

- (5) The New York Zoological Society and the City of New York have agreed to construct an aquarium, as funds become available, at an estimated total cost (to be shared equally) of \$7,100,000, of which the initial stage (of approximately \$1,550,000) was completed May 31, 1957. The Society is also committed to make payments totaling approximately \$1,700,000 for construction and alteration of certain exhibits.
- (6) There are two pension plans, covering substantially all of the Society's full-time employees. The total pension expense for 1970 was \$103,278. The Society's policy is to fund pension cost accrued, and no unfunded past service cost or unfunded vested benefits existed at December 31, 1970. The assets of the pension fund, which approximated \$3,100,000 at December 31, 1970, are not recorded in the accompanying financial statements.
- (7) The Society is the ultimate beneficiary under a trust held by Community Funds, Inc., of New York, N. Y. Basically, the income arising from the investments of the principal sum is paid to the Society for current restricted purposes.

PEAT, MARWICK, MITCHELL & CO.
CERTIFIED PUBLIC ACCOUNTANTS
345 PARK AVENUE
NEW YORK, NEW YORK 10022

The Board of Trustees
New York Zoological Society:

We have examined the balance sheet of New York Zoological Society as of December 31, 1970 and the related summary of financial activities and statement of changes in fund balances for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, except for the valuation of certain fixed assets as described in note 1 to the financial statements, the accompanying financial statements present fairly the financial position of New York Zoological Society at December 31, 1970 and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year, except for the current inclusion of pledges receivable.

Peat, Marwick, Mitchell & Co.

March 11, 1971

THE PENSION FUND (Founded by Andrew Carnegie)
Statement of Cash Transactions
Year ended December 31, 1970

Balance at beginning of year		
Investments (quoted market value \$2,783,526)		\$ 2,974,046
Uninvested balance of cash		122,038
		<u>\$ 3,096,084</u>
 Receipts:		
Income from investments:		
Interest	\$ 127,325	
Dividends	<u>39,908</u>	<u>167,233</u>
		\$ 3,263,317
 Expenditures:		
Refunds	\$ 3,155	
Pension disbursements	102,022	
Custodian fees	4,770	
Actuarial fees	<u>5,860</u>	<u>115,767</u>
		\$ 3,147,550
 Net gain on investment transactions		17,955

The Board of Trustees
New York Zoological Society:

We have examined the statement of cash transactions of The Pension Fund (founded by Andrew Carnegie) of the New York Zoological Society for the year ended December 31, 1970 and the supporting schedule of investments as of December 31, 1970. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying statement of cash transactions for the year ended December 31, 1970, together with the aforementioned supporting schedule, presents fairly the results of recorded cash transactions of The Pension Fund of the New York Zoological Society for the year then ended and the assets of the Fund at December 31, 1970, on a basis consistent with that of the preceding year.

Peat, Marwick, Mitchell & Co.

March 12 1971

The Board of Trustees
New York Zoological Society:

We have examined the statement of the Principal Fund of the Permanent Wild Life Protection Fund for the year ended December 31, 1970, set forth below:

Cash	\$ 28,702
Amount due from New York Zoological Society	20,019
Investments, at cost (quoted market value \$163,538)	<u>172,052</u>
Principal Fund:	
Balance at beginning of year	\$ 227,883
Deduct net loss on disposal of investments	<u>7,110</u>
Balance at end of year	<u><u>\$ 220,773</u></u>

Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In accordance with the agreement establishing this Fund, the income from the investments of \$9,929 was paid over to the New York Zoological Society to be used for the specific purposes set forth in such agreement.

In our opinion, the above statement of the Principal Fund presents fairly the financial position of the Permanent Wild Life Protection Fund at December 31, 1970, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year. The supplementary data included in Schedule 1 have been subjected to the same auditing procedures and, in our opinion, are stated fairly in all material respects when considered in conjunction with the statement of the Principal Fund.

Peat, Marwick, Mitchell & Co.

March 11, 1971



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Founded by the New York Zoological
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"I bequeath _____ to the New York Zoological Society, of the City of New York, for its general purposes."

(To the extent provided by law, contributions to the society are deductible for Federal income and gift tax purposes. Bequests to the society are deductible for Federal estate tax purposes.)

The photograph of the Lila Acheson Wallace World of Birds on page 2 by Alexandre Georges. Photographs on pages 4, 13, 14, 25, 26, 31, and 44 by Paul G. Kovac. All others by NYZS, Sam Dunton, and Bill Meng.

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